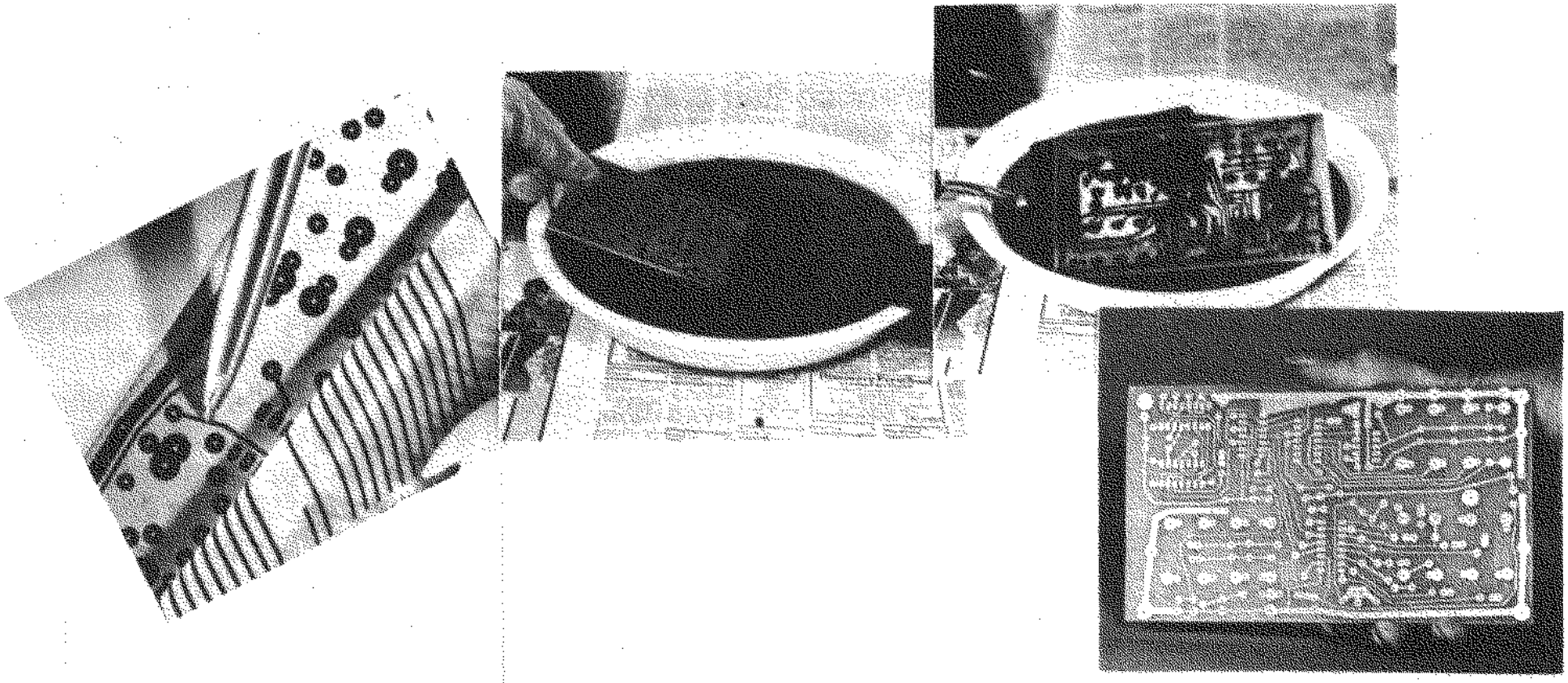
DIRECT ETCH™ Printed Circuit Etch Kit



Here's everything you need to make printed circuit boards with no separate artwork. You "wire" the actual circuit by rubbing down etch resistant component patterns right on a copper-clad board. Connect the patterns with etch resist tape or dry transfer resist traces, etch in ferric chloride solution and in a few minutes the board can be drilled, loaded and in operation.

This kit contains:

- Four 1/16" copper clad blank circuit boards
- Eight sheets "Direct Etch" dry transfer patterns and traces
- Two 120" rolls etch resist tape (one ea. 1/16" and 1/32" wide)
- One 1/4 pound package dry ferric chloride etchant
- Combination storage box and etch tray

INSTRUCTIONS

1. Dissolve the contents of the ER-3 etchant package in enough warm water to make one pint of solution. Follow the instructions on the package header to avoid spattering. Do not use or store the liquid etch in metallic containers or containers with metal caps. See the "ER-3 Material Safety Data Sheet" available from your distributor or DATAK for further handling, safety and disposal precautions.

2. Scour the copper-clad side of your PC board with Ajax, Comet or a similar cleanser until all grease spots and marks are removed. Dry with a paper towel, taking care not to get any finger marks on the copper.

3. If you are duplicating a printed circuit pattern from a magazine, cut out the pattern or make a xerox copy. Proceed to step 6.

4. If you are making a PC from your own circuit schematic, make a rough 1X scale pencil layout showing part positions and circuit interconnections. You may use a drafting template, patterns from this set, DATAK's "DE" patterns or JotDraft™ 1X PC patterns. Draw the connections in colored pencil.

5. If you have a CAD program for your PC computer, you can rapidly generate printed circuit art suitable for use with DATAK's ER-4 Photo Etch Set, or as a layout for the following steps.

6. Cut your PC board to size. Tape a piece of carbon paper over the copper surface. Next tape the circuit pattern drawing over the carbon. Use a spring-loaded center punch or even a nail and small hammer to punch a dimple where the center of each donut pad will be positioned. Now use a ball point pen or ball stylus to trace over each connecting line in your circuit pattern drawing. Remove the drawing and carbon paper from the board.

7. Using your layout as a guide, begin applying appropriate dry transfer pad patterns wherever an IC or other component is positioned. Transfer patterns by removing the blue backing paper, placing the pattern sheet on the copper and then rubbing over each pad with a spoon burnisher (Cat. #04159) or ball stylus (Cat. #04158). Peel the sheet away leaving the pattern on the copper foil. Do NOT use a ball point pen. The small tip tends to wrinkle the pattern. If etchant gets under the wrinkles, it will corrode or remove the underlying copper.

8. After transferring, place the blue backing paper over the board and burnish all the transfers

as hard as possible with a small rounded tool like Cat. #04157 broad burnisher or the back of a pocket comb.

The patterns supplied in this set are only a small sampling of the Direct Etch™ patterns available from DATAK. The "DE-973 Direct Etch Pattern Set" contains 69 different pattern sheets for most any through hole or surface mount component made and sheets of lines from .014" to .125".

9. If you can accept slightly ragged trace edges and your board interconnections are uncrowded, it is fastest to connect pads with the 1/32" or 1/16" etch resistant tapes supplied. Excess tape should be cut off over a pad by pulling up against a sharp knife blade such as a single edge razor blade or drafting knife, Cat. #12161. Avoid cutting down with the knife. This will cut through the pad. Avoid sharp curves or tape kinks. These will allow etchant to creep under and corrode or break your etched trace.

10. The circles, jogs, squeeze-throughs and straight line segments are for interconnecting your circuit with dry transfers. To transfer part of a circle or line, do as follows:

a) Measure by placing the sheet and backing paper so the line is over the pads to be connected.

b) With a SHARP drafting knife (#12161), cut through the transfer sheet where you want the line to end. Don't cut through the backing paper and don't cut into any previously transferred patterns.

c) Shift the backing paper off the line to be transferred and rub down the line segment. Remove the transfer sheet, put the blue backing paper over the transferred line and burnish hard.

d) The neck-down part of squeeze-throughs are designed to fit between adjacent DIP pads. This section is only .015" wide, so burnish well to insure no undercuts or breaks when you etch.

11. Use safety goggles and gloves to avoid getting ferric chloride solution in your eyes or on your skin. The solution stains permanently so be careful. Heat the ferric chloride solution to about 125°F to speed etch action. Use the storage box in this kit or a Pyrex baking dish as an etch tray. Do NOT use a metal tray or implements. Submerge the board in the solution, copper side up. Agitate the tray every 30 seconds and check the board after about 7 minutes. Etching will be complete between 5 and 10 minutes. A spray etch tank or a good bubble etcher (Cat. ER-12) will halve these times. DO NOT OVERETCH. The etchant can undercut the dry transfer resist and even sever narrow traces.

12. Remove the resist patterns with hexane, rubber cement thinner, mineral spirits or ER-8 Developer; and a "Scotch-Brite" pad. If you prefer, you can submerge the board in a dish of thinner and wait an hour. The resist patterns should rub away with no scouring needed. For oxidation resistance, tin plate the finished board with "ER-18 TINNIT™".

REGISTRATION OF TWO-SIDED BOARDS

1. Transfer side 1 including "vias" (pads for through-hole circuit connections).
2. Don't etch. Drill through the via pads with a #65 drill (.035"); then use the holes on side 2 for circuit registration.
3. Transfer the circuit to side 2; then etch, clean and plate with TINNIT. Put short loops of #30 or smaller wire through the via holes and solder both sides.

OTHER SETS FROM DATAK

ER-2 Direct Etch dry transfer Patterns and Tapes. Refill for this ER-1 kit.
ER-13 Contains 4 identical donut sheets as supplied in this ER-1 kit.
ER-14 Contains 4 identical sheets of DIP, flatpack and SOT pads as supplied in this ER-1 kit.
ER-3 Dry Concentrated Etchant, ¼ pound. Refill for this ER-1 kit.
ER-4 Photo Etch™ Set. Contains all materials to photographically produce printed circuits using your own artwork or artwork from an electronic or amateur radio magazine.
ER-11 One 5"x6" and one 3"x4½" clad one side phenolic circuit board.
ER-12 Power Etch air pump. To speed PC board etching.
ER-15 Direct Etch Resist Pen. Use to draw your circuit on a copper-clad board.
ER-18 TINNIT™ Electroless Bright Tin Plate. A dry powder. Will plate about 600 sq. inches of copper clad circuit boards.
DE-973 Full Range Direct Etch Master Assortment. Contains 69 sheets of all through hole and surface mount patterns manufactured by DATAK. Also contains straight connection lines from .014" to .125".

WARNING! Contains **ANHYDROUS FERRIC CHLORIDE**. Liberates heat when dissolved in water. Harmful if swallowed. Avoid skin contact. Wash after handling. For professional use only. Refer to material safety data sheet for complete safety information.

INSTRUCTIONS: Dissolve contents in 16 ounces of warm water. **SLOWLY** pour the chemical into water while stirring with a glass or plastic implement. Do not use a metal container. Do not pour water over the dry powder and do not pour rapidly; either will cause dangerous boiling or spattering.

To use, pour into a plastic or glass tray. Immerse the circuit board and agitate constantly. You can etch boards in a few minutes by heating the solution to 125° F. And using the No. ER-12 "Pow'r Etch" pump. Be sure to cover the area with newspaper or plastic to simplify cleanup.

Store partly used etch solution in a glass or plastic bottle with a plastic cap. Contents will etch up to 400 square inches of 1 ounce copper clad board. Material Safety Data Sheets gives neutralizing and disposal instructions.

INSTRUCTIONS:

1. Scour copper board with cleanser. Dry well.
2. To transfer patterns, remove blue backing paper, position transfer sheet on copper and rub lightly over each pad with a ball point pen. Peel sheet away. Set patterns in place by covering with the blue backing and burnishing hard with a plastic burnisher (DATAK #04157) or the back of a pocket comb.
3. Connect patterns with resist tape or with dry transfer lines and arcs. Tape is faster but dry transfers give superior etch quality.
4. After completing the circuit, burnish again and check for wrinkles or breaks. Redo if required before etching.
5. Etch in DATAK ER-3 DIRECT ETCH™ etchant or in an industrial grade etchant. A bubble etcher like DATAK's ER-12 will speed up the etch process.